畅想物联网·中国 | Internet Of Things

物联网大趋势

张铎 著

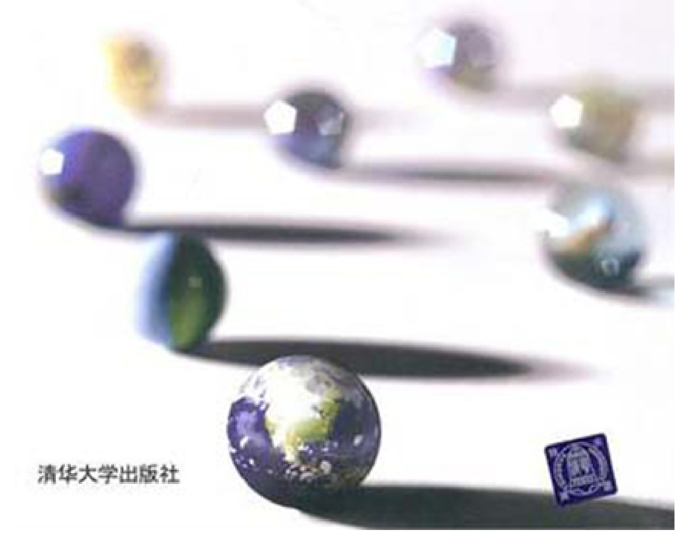


清华大学出版社

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CPU	66～100 MHz 的 486 处理器
内存	4～8M
硬盘	540MB
显卡	ISA/VESA 接口的 VGA
光驱	1X/2X CD-ROM
显示器	14 寸 CRT(隔行或逐行)
声卡	8/16 位兼容声卡
其他流行配件	VCD 解压卡

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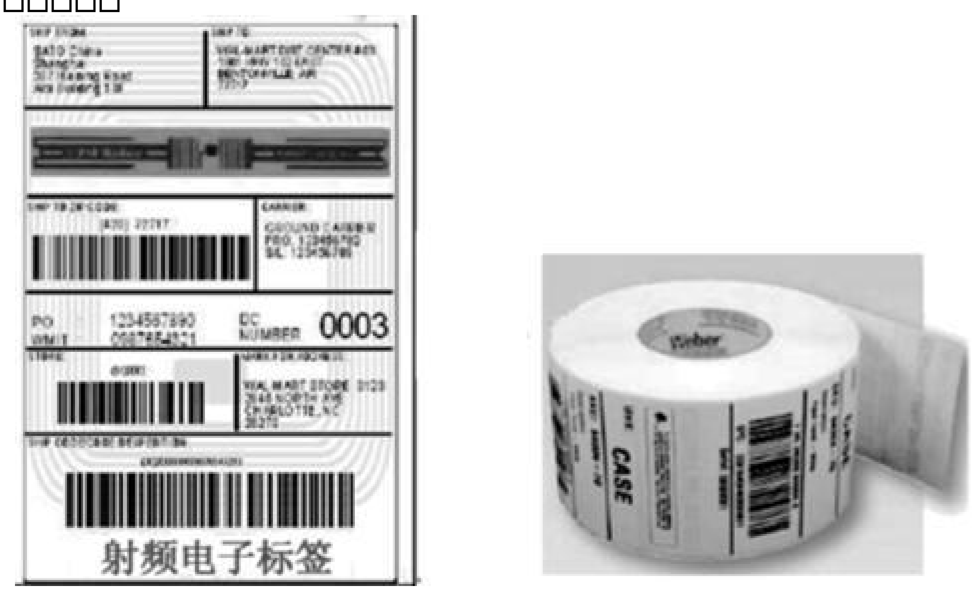
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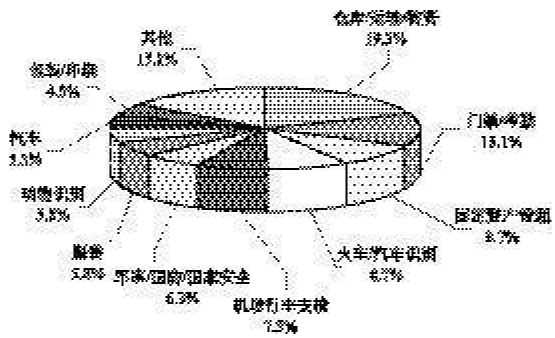
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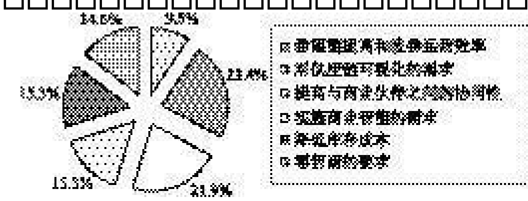
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	应用	零售	轿车
通信与网络			
基础平台	计算机技术	RFID技术	传感技术

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CPU	Intel Core 2 Duo E6550(盒)
主板	微星 P35 Neo2-FR
内存	威刚 ADATA 1GB DDR2 800(红色威龙)
硬盘	希捷 160G 7200.10 8M(串口/5年盒)
显卡	七彩虹 镭风 2600XT-GD3 CF 白金版
光驱	先锋 DVD-227

Intel Core 2 Duo E6550(□)□□□□□1-4□□□□ P35 Neo2-FR
□□□□□1-5□□□□ADATA 1GB DDR2 800(□□□□)□□□□1-6□
□□□ 160G 7200.10 8M(□□/5□□)□□□□□1-7□□□□□□
2600XT-GD3 CF□□□□□□□□1-8□□□□ DVD-227□□□□□1-9□
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□1-4   Intel Core 2 Duo E6550(□)□□□

处理器频率	2 330 MHz
前端总线	1 333 MHz
二级缓存	2MB * 2 KB
插槽结构	LGA775
工艺	0.065 微米
处理器倍频	7 倍
系统总线	333 MHz

□1-5   □□ P35 Neo2-FR□□□□

集成芯片	声卡/网卡
主芯片组	Intel P35
芯片组描述	采用 Intel P35+ICH9R 芯片组
音频芯片	集成 Realtek ALC888 声卡芯片
网卡芯片	板载 Realtek 8111B 千兆网卡

□1-6   □□ADATA 1GB DDR2 800(□□□□)□□□□

内存容量	1GB
内存主频	800MHz
内存传输类型	DDRⅡ
接口类型	240Pin

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硬盘容量	160GB
接口类型	ATAPI-IDE
缓存(KB)	3 000 KB
转速/分	7 200 转/分

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RAMDAC 频率	400MHz
显卡核心频率	800MHz
显存频率	1 960MHz
显卡显存容量	256MB
最大分辨率	2 560×1 600

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光驱种类	DVD-ROM
接口类型	SATA
DVD-RAM 最大读取倍速	16X
CDROM 读取倍速	40X
DVD 平均寻道时间	100MS
缓存区容量	2MB

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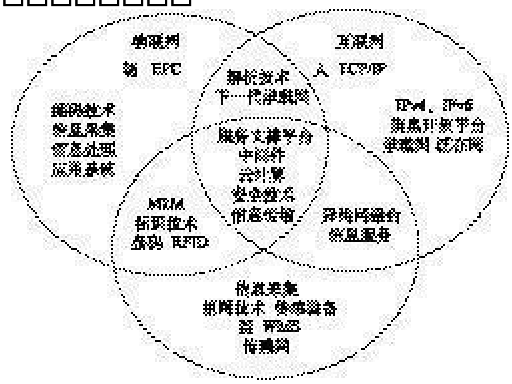
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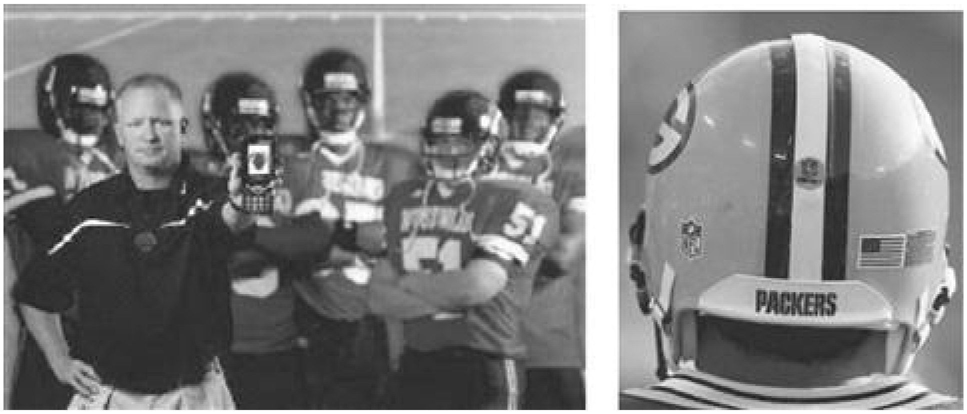
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[illegible]A[illegible]2009[illegible]9[illegible]15[illegible]2009[illegible]9[illegible]14[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]7[illegible]30%[illegible]50%[illegible]70%[illegible]10%[illegible]20%[illegible]46.79%[illegible]44.04%[illegible]

2009[illegible]9[illegible]ST[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]2009[illegible]2009[illegible]12[illegible]19.99 1.11%[illegible]21.59 0.42%[illegible]19.50 2.69%[illegible]12.60 4.13%[illegible]22.20 8.08%[illegible]

[illegible]2010[illegible]3[illegible]17[illegible]2009[illegible]11[illegible]18[illegible]20.79[illegible]400[illegible]400[illegible]

2010[illegible]3[illegible]19[illegible]3 000[illegible]“5·19”[illegible]3 000[illegible]

[illegible]3 000[illegible]17[illegible]17[illegible]1.93[illegible]

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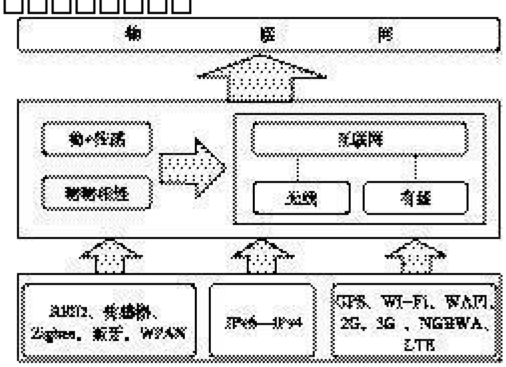
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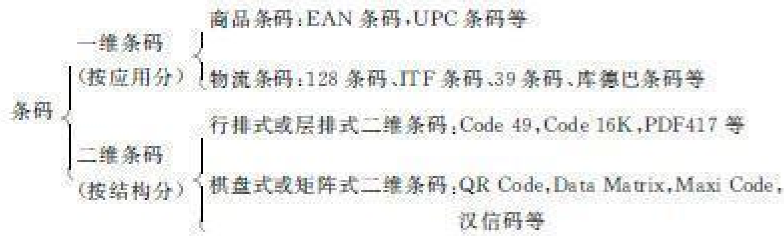
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Dot Matrix Barcode)[illegible]QR Code[illegible]Data Matrix[illegible]Code One[illegible]Maxi Code[illegible]4-3[illegible]



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(3) [illegible](ZigBee)[illegible]2002[illegible]ZigBee Alliance[illegible](bee)[illegible]“[illegible]”(zig)[illegible]“[illegible]”[illegible]

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	无线局域网（WLAN）	蓝牙（Bluetooth）	紫蜂（ZigBee）	超宽带（UWB）
传输速率	高	低	低	高
功耗	高	高	低	低
有效范围	30～50 米	10 米以下	10 米	10 米以下
成本	高	高	低	低
安全性	高	高	低	低
复杂度	高	高	低	低

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[illegible]1968[illegible]ALOHA[illegible]1973[illegible](DARPA)[illegible]“[illegible](PRNET)”[illegible]4-2[illegible]

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	现有无线网络	自组织网络
无线网络结构	有中心	无中心
拓扑结构	固定	动态建立，灵活变化
有无基础设施支持	有	无
安全性和服务质量	较好	较差
配置速度	慢	快
生存时间	长	短
路由选择与维护	容易	困难
网络健壮性	低	高
位置	物理层和链路层	协议的所有层
中继设备	基站和有线骨干网	无线节点和无线骨干网
中继节点的特性	基站有多部收发信机，全双工方式通信，有专用硬件，易于实现全网同步	节点通常只有一部收发信机，半双工方式工作，不易实现全网同步
无线节点的控制管理	由基站集中负责，无线节点通过基站与目的节点通信	由节点本身负责，通常采用分布式方式

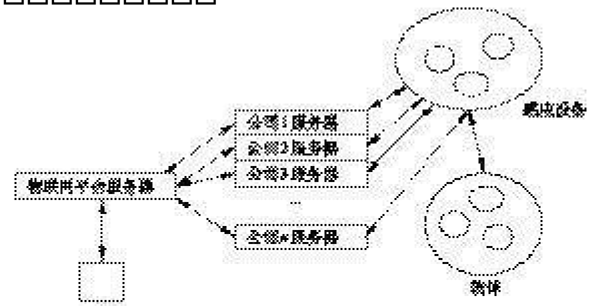
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2. M2M[illegible]

M2M(machine to machine)[illegible]2002[illegible]M2M[illegible]“[illegible]”[illegible]M2M[illegible]

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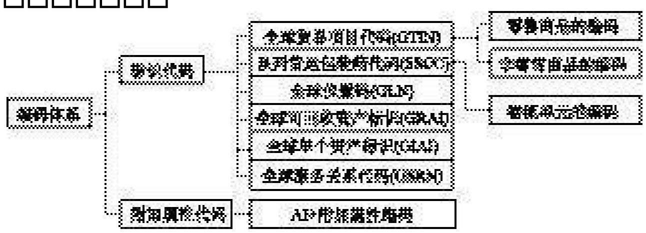
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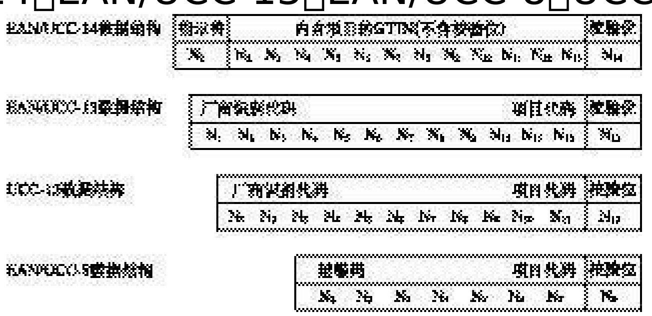
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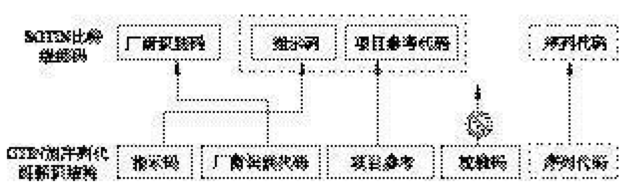
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(1) SGTIN-96

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□5-1 SGTIN-96□□□□

	标头	滤值	分区	厂商识别代码	商品项目代码	序列号
	8	3	3	20-40	24-4	38
SGTIN-96	0011 0000（二进制值）	（值参照表 5-4）	（值参照表 5-5）	999 999-999 999 999 999（最大十进制范围）*	9 999 999-9（最大十进制范围）*	274 877 906 943（最大十进制值）

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类型	二进制值
所有其他	000
零售消费者贸易项目	001
标准贸易项目组合	010
单一货运/消费者贸易项目	011
不在 POS 销售的内部贸易项组合	100
保留	101
保留	110
保留	111

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分区值	厂商识别代码		指示符和商品项目代码	
	二进制	十进制	二进制	十进制
0	40	12	4	1
1	37	11	7	2
2	34	10	10	3
3	30	9	14	4
4	27	8	17	5
5	24	7	20	6
6	20	6	24	7

(2) SGTIN-198

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□5-4 SGTIN-198□□□□

	标头	滤值	分区	厂商识别代码	商品项目代码	序列号
	8	3	3	20-40	24-4	140
SGTIN-198	0011 0110（二进制值）	（值参照表 5-4）	（值参照表 5-5）	999 999-999 999 999 999（最大十进制范围）*	9 999 999-9（最大十进制范围）*	最多 20 个字符

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图形符号	名称	编码表示	图形符号	名称	编码表示
!	感叹号	2/1	M	拉丁大写字母 M	4/13
"	双引号	2/2	N	拉丁大写字母 N	4/14
%	百分号	2/5	O	拉丁大写字母 O	4/15
&	和	2/6	P	拉丁大写字母 P	5/0
'	撇号	2/7	Q	拉丁大写字母 Q	5/1
(	左圆括号	2/8	R	拉丁大写字母 R	5/2
)	右圆括号	2/9	S	拉丁大写字母 S	5/3
*	星号	2/10	T	拉丁大写字母 T	5/4
+	正号	2/11	U	拉丁大写字母 U	5/5
,	逗号	2/12	V	拉丁大写字母 V	5/6
-	负号	2/13	W	拉丁大写字母 W	5/7
.	句点	2/14	X	拉丁大写字母 X	5/8
/	斜线	2/15	Y	拉丁大写字母 Y	5/9
0	数字 0	3/0	Z	拉丁大写字母 Z	5/10
1	数字 1	3/1	_	下横线	5/15
2	数字 2	3/2	a	拉丁小写字母 a	6/1
3	数字 3	3/3	b	拉丁小写字母 b	6/2
4	数字 4	3/4	c	拉丁小写字母 c	6/3
5	数字 5	3/5	d	拉丁小写字母 d	6/4
6	数字 6	3/6	e	拉丁小写字母 e	6/5
7	数字 7	3/7	f	拉丁小写字母 f	6/6
8	数字 8	3/8	g	拉丁小写字母 g	6/7
9	数字 9	3/9	h	拉丁小写字母 h	6/8
:	冒号	3/10	i	拉丁小写字母 i	6/9
;	分号	3/11	j	拉丁小写字母 j	6/10
<	小于号	3/12	k	拉丁小写字母 k	6/11
=	等号	3/13	l	拉丁小写字母 l	6/12
>	大于号	3/14	m	拉丁小写字母 m	6/13
?	问号	3/15	n	拉丁小写字母 n	6/14
A	拉丁大写字母 A	4/1	o	拉丁小写字母 o	6/15
B	拉丁大写字母 B	4/2	p	拉丁小写字母 p	7/0

□□

图形符号	名称	编码表示	图形符号	名称	编码表示
C	拉丁大写字母 C	4/3	q	拉丁小写字母 q	7/1
D	拉丁大写字母 D	4/4	r	拉丁小写字母 r	7/2
E	拉丁大写字母 E	4/5	s	拉丁小写字母 s	7/3
F	拉丁大写字母 F	4/6	t	拉丁小写字母 t	7/4
G	拉丁大写字母 G	4/7	u	拉丁小写字母 u	7/5
H	拉丁大写字母 H	4/8	v	拉丁小写字母 v	7/6
I	拉丁大写字母 I	4/9	w	拉丁小写字母 w	7/7
J	拉丁大写字母 J	4/10	x	拉丁小写字母 x	7/8
K	拉丁大写字母 K	4/11	y	拉丁小写字母 y	7/9
L	拉丁大写字母 L	4/12	z	拉丁小写字母 z	7/10

2) [illegible](SSCC)

SSCC[illegible]EAN·UCC[illegible]GTIN[illegible]SSCC[illegible]EPC[illegible]

SSCC[illegible]

[illegible]EAN[illegible]UCC[illegible]EAN·UCC [illegible]SSCC[illegible]

[illegible]EPC[illegible]SSCC[illegible]——[illegible]SSCC[illegible]5-4[illegible]



[illegible]5-4 SSCC[illegible]

SSCC[illegible]EPC[illegible]EAN·UCC[illegible]SSCC[illegible]EPC[illegible]

[illegible]SSCC-96[illegible]SSCC[illegible]

[illegible]SSCC-96[illegible]4[illegible]5-6[illegible]

[illegible]5-6 SSCC-96[illegible]

	标头	滤值	分区	厂商识别代码	序列号	未分配
SSCC-96	8	3	3	20-40	38-18	24
	0011 0001（二进制值）	（值参照表 5-9）	（值参照表 5-10）	999 999-999 999 999 999（最大十进制范围）*	99 999 999 999-99 999（最大十进制范围）	（未使用）

*[illegible]

[illegible]8[illegible]0011 0001[illegible]

[illegible]SSCC-96[illegible]5-7[illegible]

[illegible]5-7 SSCC-96[illegible]

类型	二进制值
所有其他	000
未定义	001
物流/货运单元	010
保留	011
保留	100
保留	101
保留	110
保留	111

[illegible]SSCC[illegible]SSCC-96[illegible]6[illegible]12[illegible]11[illegible]5[illegible]5-8[illegible]

[illegible]5-8 SSCC-96[illegible]

分区值	厂商识别代码		序列号和扩展位	
(P)	二进制 (M)	十进制 (L)	二进制 (N)	十进制
0	40	12	18	5
1	37	11	21	6
2	34	10	24	7
3	30	9	28	8
4	27	8	31	9
5	24	7	35	10
6	20	6	38	11

SSCC-96[illegible]SSCC[illegible]

SSCC-96[illegible]SSCC[illegible]SSCC[illegible]SSCC[illegible]5-6[illegible]SSCC-96[illegible]([illegible])[illegible]12[illegible]9 999[illegible]6[illegible]9 999 999 999[illegible]

[illegible]

3) [illegible](SGLN)

GLN[illegible]EAN·UCC[illegible]GLN[illegible]GLN[illegible]([illegible])[illegible]“[illegible]”[illegible]

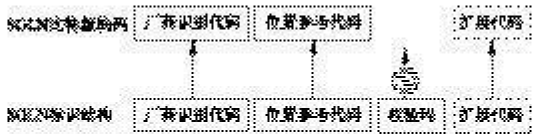
[illegible]EPC GLN[illegible]GLN[illegible]

SGLN[illegible]

[illegible]EAN[illegible]UCC[illegible]EAN·UCC GLN[illegible]

[illegible]

[illegible]



□5-5　SGLN□□□□

SGLN□□□□□□□5-5 □□□□□□EPC□□□□EAN·UCC □□GLN□□□□□□□□□□□□□□□□□□□□□□SGLN-96 (96 □) □SGLN-195 (195 □)□□□□□□□

(1) SGLN-96

□□□□□□□SGLN-96□□□5□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□5-9□□□

□5-9　SGLN-96□□□□

	标头	滤值	分区	厂商识别代码	位置参考代码	扩展代码
SGLN-96	8	3	3	20-40	21-1	41
	0011 0010（二进制值）	（值参照表 5-12）	（值参照表 5-13）	999 999-999 999 999 999（最大十进制范围）*	99 999-0（最大十进制范围）*	999 999 999 999（最大十进制范围）

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□□8□□□□□□□0011 0010□

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□5-10　SGLN-96□□

类型	二进制值
所有其他	000
保留	001
保留	010
保留	011
保留	100
保留	101
保留	110
保留	111

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SGLN-96□□□□□□□□□□□□□□GLN□□□□□□□□□□□□□□□□□□□□□□SGLN-96□□□□□□□□□□□□□□GLN□□□□□□□□□□□□□□□□□□

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□5-11   SGLN-96□□

分区值	厂商识别代码		位置参考代码	
(P)	二进制 (M)	十进制 (L)	二进制 (N)	十进制
0	40	12	1	0
1	37	11	4	1
2	34	10	7	2
3	30	9	11	3
4	27	8	14	4
5	24	7	17	5
6	20	6	21	6

(2) SGLN-195

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□5-12   SGLN-195□□□□

	标头	滤值	分区	厂商识别代码	位置参考代码	扩展代码
SGLN-195	8	3	3	20-40	21-1	140
	0011 1001（二进制值）	（值参照本表）	（值参照表5-13）	999 999-999 999 999 999（最大十进制范围）*	9 999 999-0（最大十进制范围）*	最多20个字符

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□□8□□□□□□□0011 1001□

SGLN-195□□□SGLN-96□□□□□□□5-10□

SGLN-195□□□SGLN-96□□□□□□□5-11□

SGLN-195□□□□□□□□□□□□□□SGLN-96□□□

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4) □□□□□□□□□□(GRAI)

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□□5-6□□□EPC□GRAI□□□□□□□□EPC□□□□EAN·UCC□□GRAI□□□□□□□EPCglobal□□□GRAI-96□GRAI-170□□□□□□□



□5-6　GRAI□□□□

(1) GRAI-96

□□□□□□GRAI-96□□□5□□□□□□□□□□□□□□□□□□□□□□□□□□5-13□□□

□5-13　GRAI-96□□□□

	标头	滤值	分区	厂商识别代码	资产类型代码	序列号
GRAI-96	8	3	3	20-40	24-4	38
	0011 0011（二进制值）	（值参照表5-16）	（值参照表5-17）	999 999-999 999 999 999（最大十进制范围）*	9 999 999-9（最大十进制范围）*	274 877 906 943（最大十进制值）

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□□8□□□□□0011 0011□

□□□□□□□□□□□□□GRAI-96□□□□5-14□

□5-14　GRAI-96□□

类型	二进制值
所有其他	000
保留	001
保留	010
保留	011
保留	100
保留	101
保留	110
保留	111

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□5-15　GRAI-96□□

分区值	厂商识别代码		资产类型代码	
（P）	二进制（M）	十进制（L）	二进制（N）	十进制
0	40	12	4	0
1	37	11	7	1

□□

分区值	厂商识别代码		资产类型代码	
(P)	二进制 (M)	十进制 (L)	二进制 (N)	十进制
2	34	10	10	2
3	30	9	14	3
4	27	8	17	4
5	24	7	20	5
6	20	6	24	6

GRAI-96[illegible]GRAI[illegible]GRAI-96[illegible]GRAI[illegible]3-19[illegible]

(2) GRAI-170

[illegible]GRAI-170[illegible]5[illegible]GRAI-96[illegible]5-16[illegible]

[illegible]5-16 GRAI-170[illegible]

	标头	滤值	分区	厂商识别代码	资产类型代码	序列号
GRAI-170	8	3	3	20-40	24-4	112
	0011 0111（二进制值）	（值参照表 5-16）	（值参照表 5-17）	999 999-999 999 999 999（最大十进制范围）*	9 999 999-9（最大十进制范围）*	最多 16 个字符

*[illegible]

[illegible]8[illegible]0011 0111[illegible]

GRAI-170[illegible]GRAI-96[illegible]5-14[illegible]

GRAI-170[illegible]GRAI-96[illegible]5-15[illegible]

GRAI-170[illegible]GRAI-96[illegible]

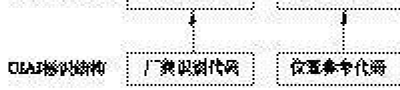
5) [illegible](GIAI)

GIAI(Global Individual Asset Identifier)[illegible]EAN·UCC [illegible]GTIN[illegible]GIAI[illegible]EPC[illegible]GIAI[illegible]

[illegible]EAN·UCC[illegible]EAN·UCC GIAI[illegible]

[illegible]EPC[illegible]EAN·UCC[illegible]

GIAI[illegible]5-7[illegible]



[illegible]5-7 GIAI[illegible]

EPC□□□□□□□□GIAI-96□GIAI-202□□□□□□□□□□□□EAN·UCC□□□□GIAI□□□□□□EPC□□□

(1) GIAI-96

□□□□□□□GIAI-96□□□4□□□□□□□□□□□□□□□□□□□□□□□□□□□□5-17□□□

表5-17 GIAI-96□□□□

	标头	滤值	分区	厂商识别代码	单个资产参考代码
GIAI-96	8	3	3	20-40	62-42
	0011 0100（二进制值）	（值参照表5-20）	（值参照表5-21）	999 999-999 999 999 999（最大十进制范围）*	4 611 686 018 427 387 903-4 398 046 511 103（最大十进制范围）

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□□8□□□□□□□0011 0100□

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□5-18 GIAI-96□□

类型	二进制值
所有其他	000
保留	001
保留	010
保留	011
保留	100
保留	101
保留	110
保留	111

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GIAI-96□□□□□□□□□□□□□□GIAI□□□□□□□□□□□□□□□□□□

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□5-19 GIAI-96□□

分区值	厂商识别代码		单个资产参考代码	
（P）	二进制（M）	十进制（L）	二进制（N）	十进制
0	40	12	42	13
1	37	11	45	14
2	34	10	48	15
3	30	9	52	16
4	27	8	55	17
5	24	7	58	18
6	20	6	62	19

(2) GIAI-202

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□5-20　GIAI-202□□□□

	标头	滤值	分区	厂商识别代码	单个资产参考代码
GIAI-202	8	3	3	20-40	168-148
	0011 1000（二进制值）	（值参照表 5-20）	（值参照表 5-23）	999 999-999 999 999 999（最大十进制范围）*	最多 24 个字符

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□□8□□□□□□□0011 1000□

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□□□GIAI□□□□□□□□□□□□□□□□6□□12□□5-21□

□5-21　GIAI-202□□

分区值	厂商识别代码		单个资产参考代码	
(P)	二进制 (M)	十进制 (L)	二进制 (N)	十进制
0	40	12	148	18
1	37	11	151	19
2	34	10	154	20
3	30	9	158	21
4	27	8	161	22
5	24	7	164	23
6	20	6	168	24

GIAI-202□□□□□□□□□□□□□□□□□□GIAI□□□□□□□□□□□□□□□□□□□□□□□□

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6) □□□□□□GID-96

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	标头	通用管理者代码	对象分类代码	序列代码
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	00110101（二进制值）	268 435 456（十进制容量）	16 777 216（十进制容量）	68 719 476 736（十进制容量）

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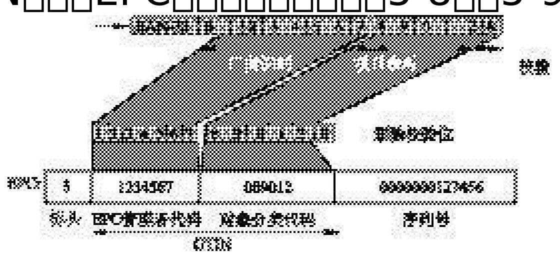
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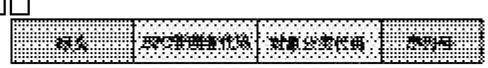
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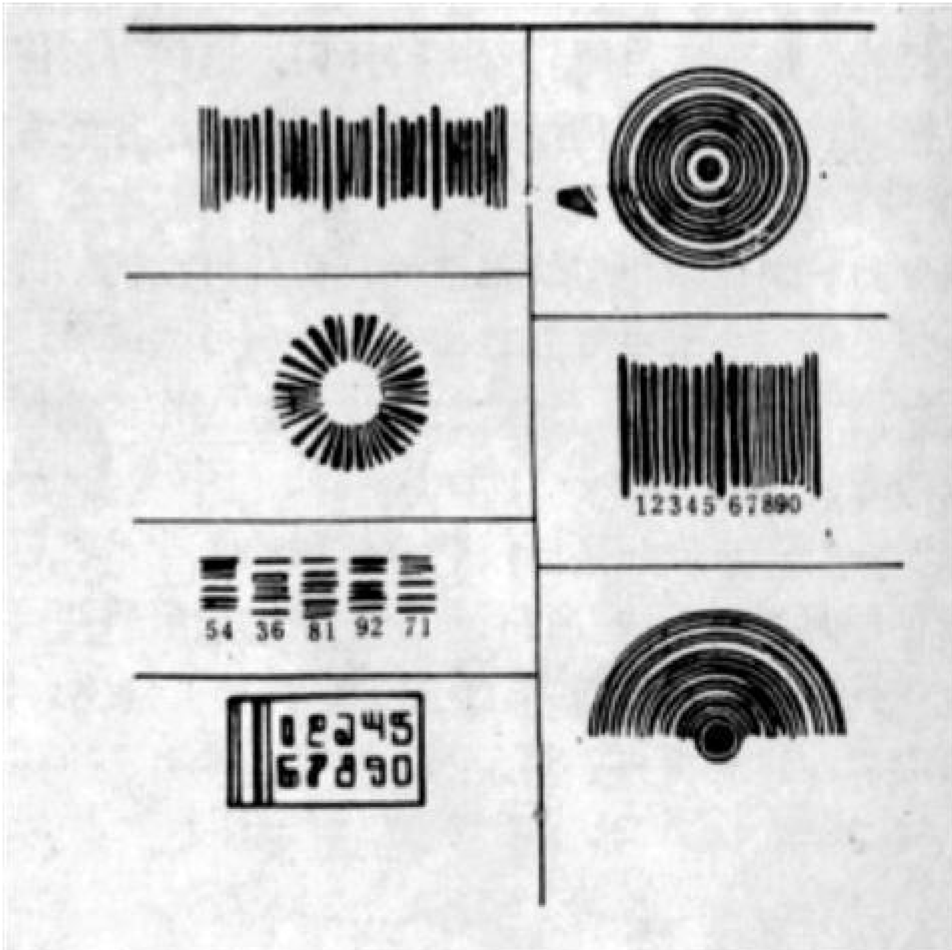
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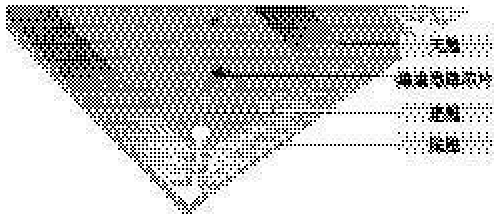
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典型应用领域	具 体 应 用
车辆自动识别管理	铁路车号自动识别是射频识别技术最普遍的应用
高速公路收费及智能交通系统	高速公路自动收费系统是射频识别技术最成功的应用之一，它充分体现了非接触识别的优势。在车辆高速通过收费站的同时完成缴费，解决了交通的瓶颈问题，提高了车行速度，避免拥堵，提高了收费结算效率
货物的跟踪、管理及监控	射频识别技术为货物的跟踪、管理及监控提供了便捷、准确、自动化的手段。以射频识别技术为核心的集装箱自动识别，成为全球范围最大的货物跟踪管理应用
仓储、配送等物流环节	射频识别技术目前在仓储、配送等物流环节已有许多成功的应用。随着射频识别技术在开放的物流环节统一标准的研究开发，物流业将成为射频识别技术最大的受益行业
电子钱包、电子票证	射频识别卡是射频识别技术的一个主要应用。射频识别卡的功能相当于电子钱包，实现非现金结算。目前主要应用在交通方面
生产线产品加工过程自动控制	主要应用在大型工厂的自动化流水作业线上，实现自动控制、监视，提高生产效率，节约成本
动物跟踪和管理	射频识别技术可用于动物跟踪。在大型养殖场，可通过采用射频识别技术建立饲养档案、预防接种档案等，达到高效、自动化管理牲畜的目的，同时为食品安全提供了保障。射频识别技术还可用于信鸽比赛、赛马识别等，以准确测定到达时间

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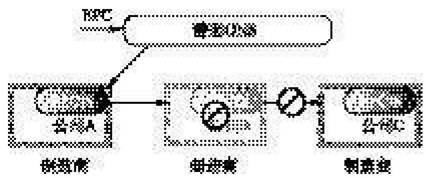
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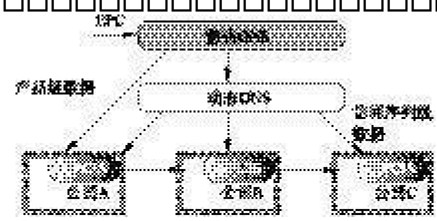
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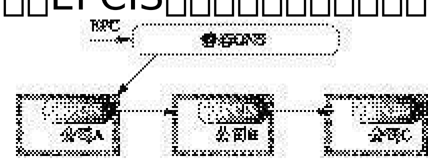
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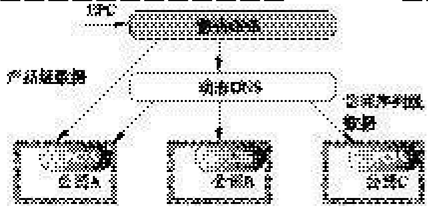
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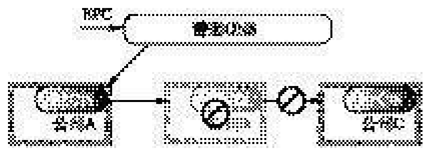
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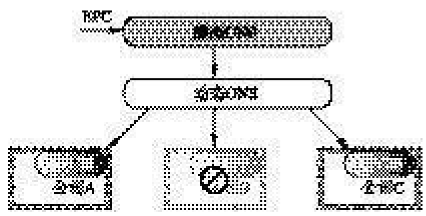
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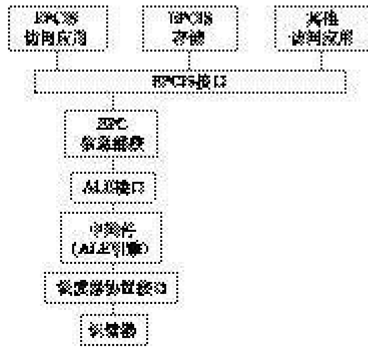
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(2) EPCIS[illegible]EPC[illegible]

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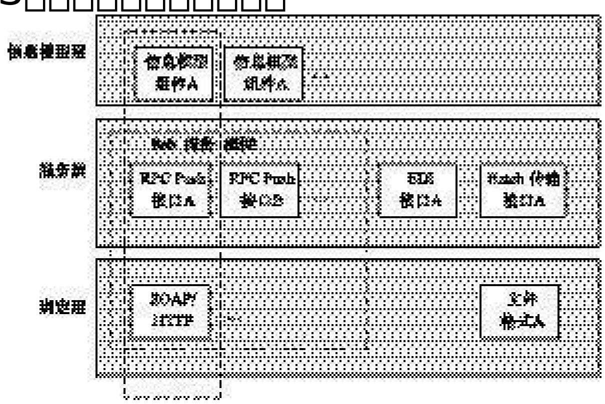


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(3) EPCIS[illegible]

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[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”(Privacy)[illegible](Trust)[illegible]“[illegible]”[illegible]DoS(Denial of Services)([illegible](eavesdropping[illegible])[illegible])[illegible]

[illegible]IT[illegible]8[illegible]4[illegible]4[illegible]“[illegible]”[illegible]“[illegible]”([illegible])[illegible]

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(2) [illegible]([illegible]PKI Credentials[illegible])[illegible]

(3) [illegible]

(4) [illegible]

(5) [illegible]Instance[illegible]SaaS[illegible]

[illegible]

1.[illegible]

[illegible](Virtual Private Network[illegible]VPN)[illegible]

VPN[illegible]Internet[illegible]

[illegible]

2.[illegible]([illegible])

[illegible]

3.[illegible]

[illegible]

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[illegible]([illegible])[illegible]([illegible])[illegible]([illegible])[illegible]

[illegible]

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[illegible](middleware)[illegible]([illegible])[illegible]([illegible]

[illegible])[illegible]=[illegible]
[illegible]5-22



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[illegible](IOT-Middleware)[illegible]RFID [illegible]RFID[illegible]EPC[illegible]

2.[illegible](IOT-MW)[illegible]

[illegible]EPC[illegible]5-23[illegible]EPC[illegible]“[illegible]EPC[illegible]”[illegible]“[illegible]EPC[illegible]”[illegible]

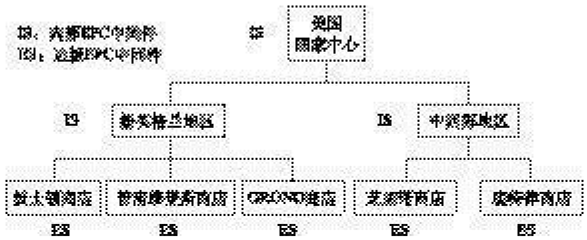


图5-23　EPC□□□□□□

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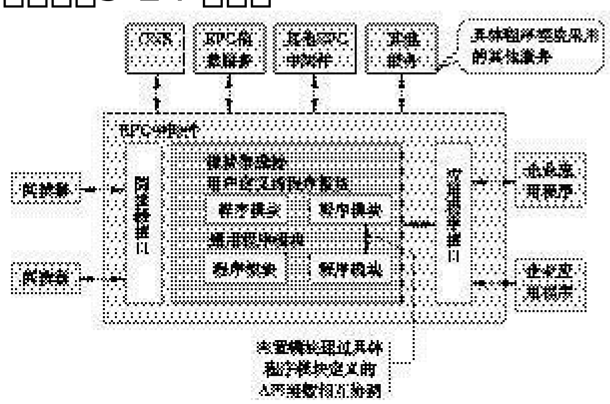


图5-24　EPC□□□□□□□□

EPC□□□□□□□□□□□□□□□□□□□

□□□□□□ (Event Management System□EMS)

□□□□□□□□□□(Real-time in-memory Event Database□RIED)

□□□□□□ (Task Management System□TMS)

3.[illegible](IOT-MW)[illegible]

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(3) [illegible](Process Flow)

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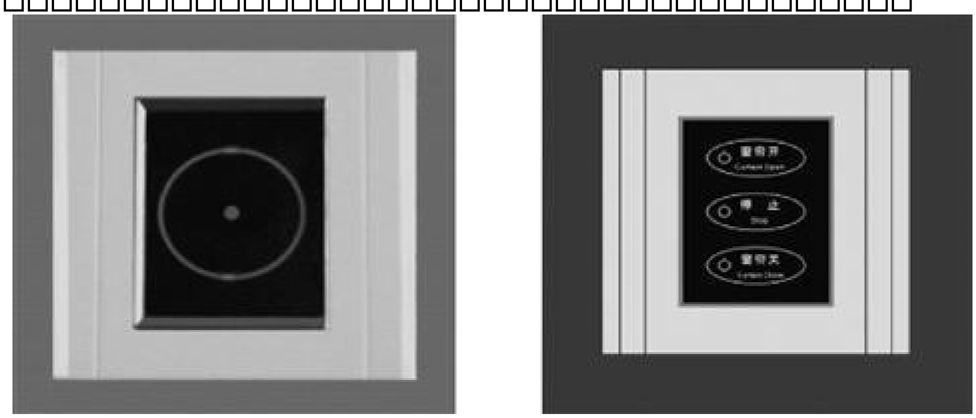


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(a)□□□□□(□□CX-IOT-KG-002)　(b)□□□□□□□□(□□CX-IOT-JK-001)

□6-4　□□□□□□□

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1	门磁	10	场景遥控器	19	厨房一路开关	28	方向幕帘	37	场景遥控器
2	壁式总控器	11	二路调光开关	20	餐厅三路开关	29	窗帘控制器	38	智能插座
3	玄关二路开关	12	窗帘控制器	21	烟雾探测器	30	分遥控器	39	红外转发器
4	智能插座	13	方向幕帘	22	网络摄像机	31	二路调光开关	40	窗帘控制器
5	三路开关	14	智能插座	23	智能插座	32	智能插座	41	方向幕帘
6	客厅一路调光开关	15	智能插座	24	智能中控器	33	过道一路开关	42	方向幕帘
7	客厅三路开关	16	阳台一路开关	25	总遥控器	34	二路开关		
8	壁式场景控制器	17	智能插座	26	红外转发器	35	二路开关		
9	智能红外	18	煤气探测器	27	窗帘控制器	36	二路调光开关		



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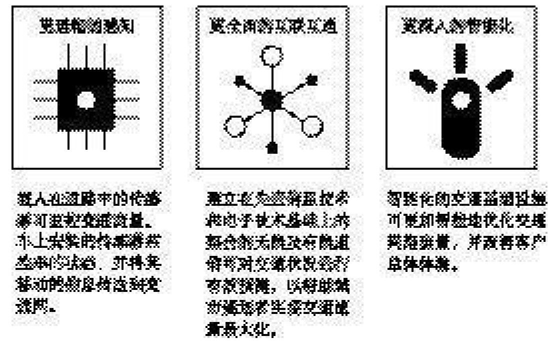
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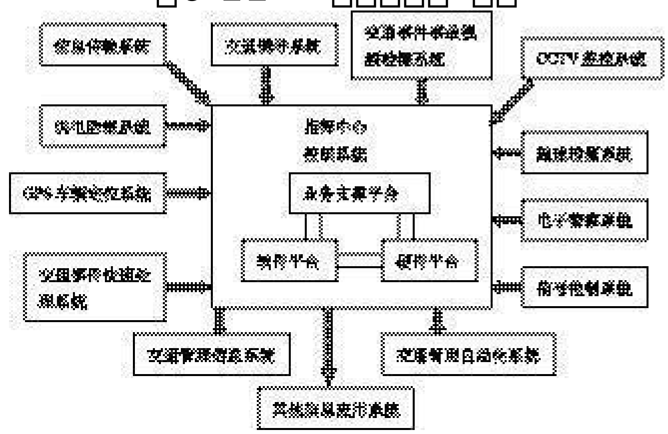
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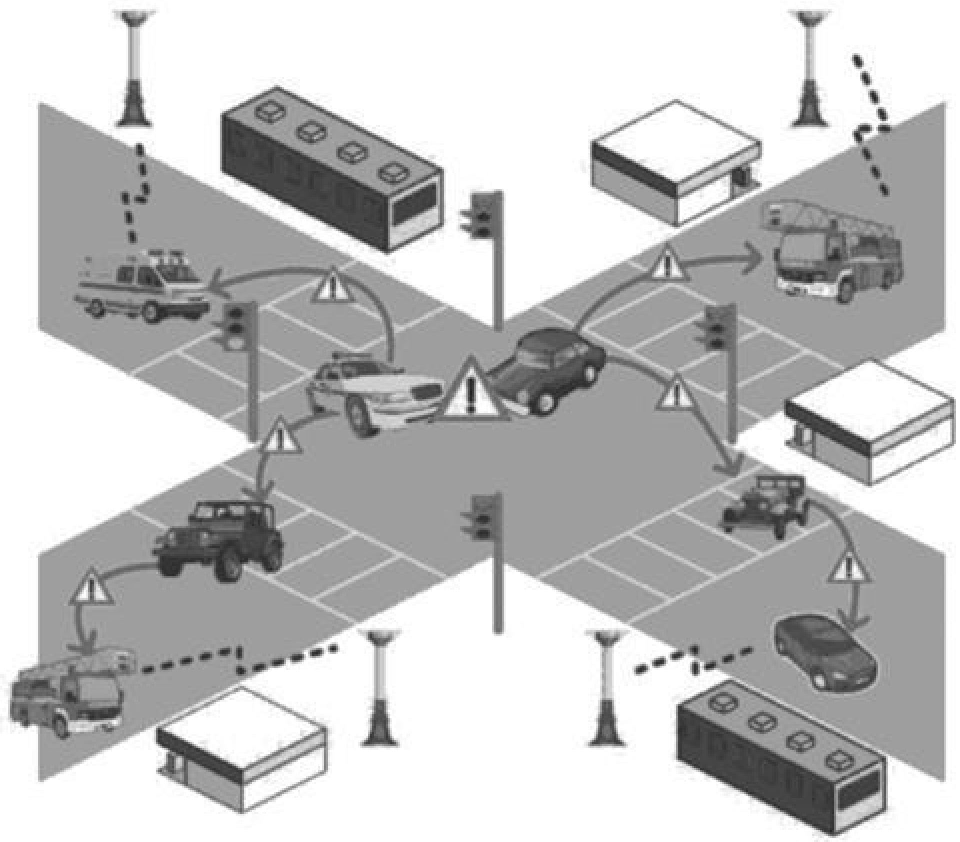
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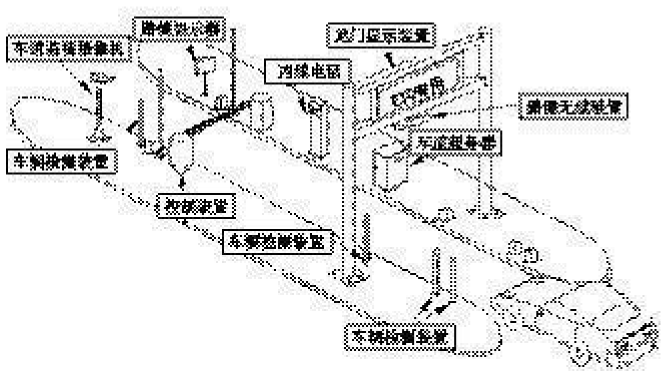
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ETC[illegible](AVI)[illegible](automatic vehicle identification[illegible]AVI)[illegible]ETC[illegible](10m[illegible])[illegible]([illegible]10[illegible])[illegible]([illegible])[illegible]ETC[illegible]6-15[illegible]



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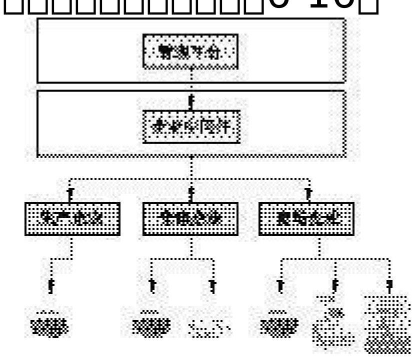
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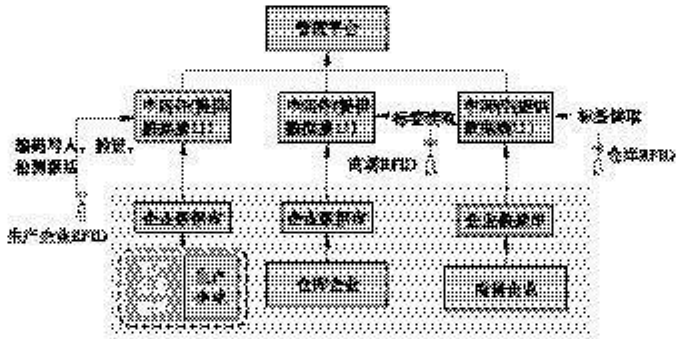
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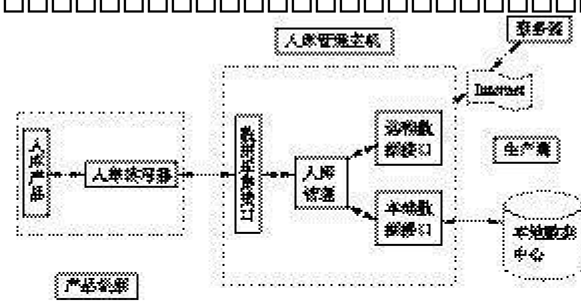
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(4) [illegible]

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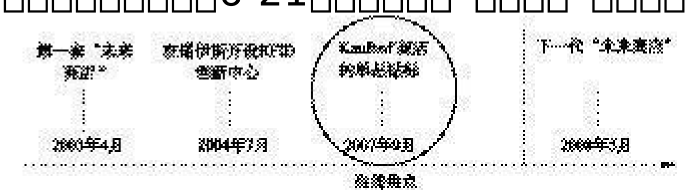
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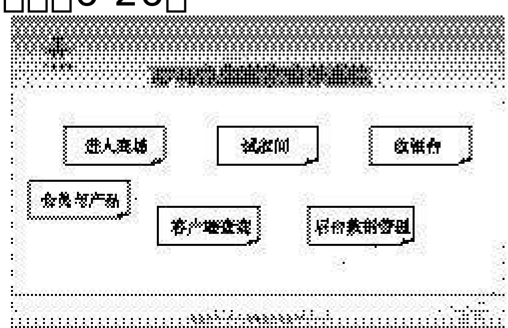


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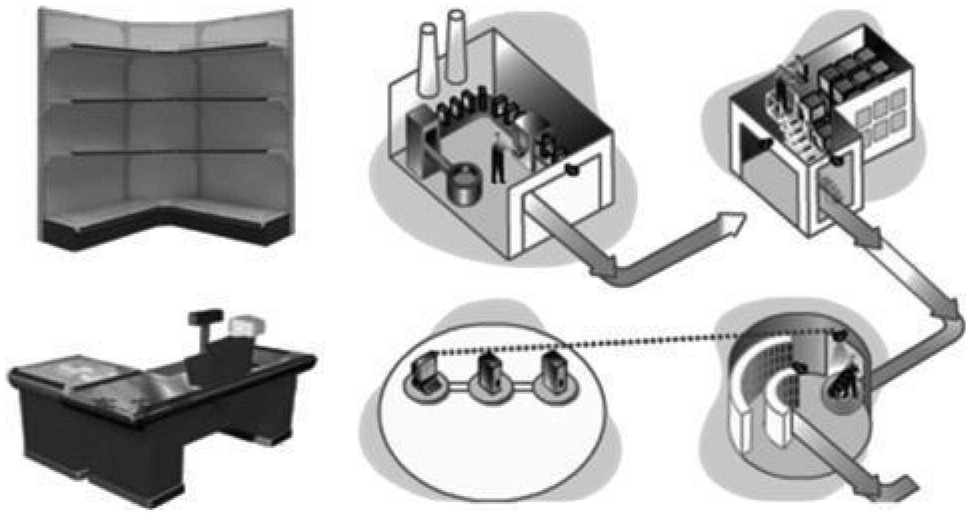


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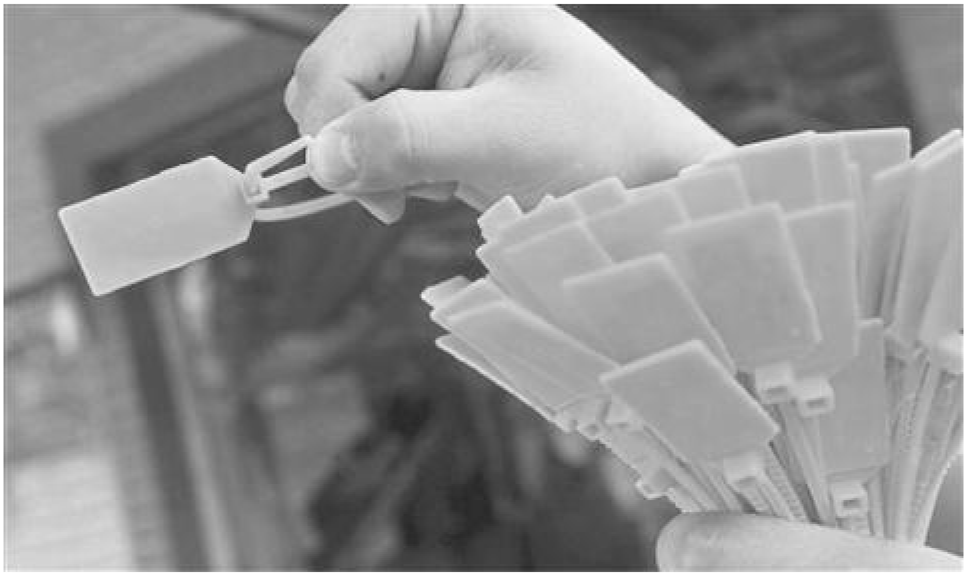
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